Paper No. 20

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte RENGASWAMY SRINIVASAN,
PERIYA GOPALAN, and PAUL R. ZARRIELLO

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Appeal No. 2002-0113
Application No. 08/799,923

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ON BRIEF

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Before PAWLIKOWSKI, POTEATE, and NAGUMO, Administrative Patent Judges.

PAWLIKOWSKI, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the examiner's final rejection of claims 1-20, which are all of the claims pending in this application.

The subject matter on appeal is represented by claims 1 and 16, set forth below:

1. A method for mapping a cathodic protection current present in a structure in the presence of a plurality of conductors in the structure, the method comprising the steps of:

sensing the magnetic field generated by the cathodic protection current in the structure resulting from the plurality of conductors;

measuring the sensed magnetic field; and

generating a cathodic protection current map using the measured sensed magnetic field.

16. A method for designing a cathodic protection system for ensuring a continuous uniform distribution of cathodic protection current throughout an entire structure comprising the step of modeling current and voltage distribution in a proposed structure using a numerical technique.

The references relied upon by the examiner as evidence of unpatentability are:

Murphy et al. (Murphy)	5,087,873	Feb. 11, 1992
Westermann et al. (Westermann)	5,466,353	Nov. 14, 1995

Claims 16-20 stand rejected under 35 U.S.C. § 112, first paragraph (enablement).

Claims 14 and 16-20 stand rejected under 35 U.S.C. § 112, second paragraph (indefiniteness).

Claims 1-15 stand rejected under 35 U.S.C. § 103 as being unpatentable over Westermann in view of Murphy.

Claims 16-20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Murphy, with or without Westermann, in view of the admitted prior art.

Appellants state that the claims stand or fall together under each rejection. (Brief, page 7). Hence, we consider claims 1, 14, and 16. 37 CFR § 1.192(a)(7)(8)(2000).

OPINION

For the reasons set forth below, we will reverse the 35 U.S.C. § 112 rejections, affirm the rejection of claims 1-15, and reverse the rejection of claims 16-20.

I. The 35 U.S.C. § 112, first paragraph (enablement) rejection of claims 16-20

On page 5 of the answer, the examiner states that the numerical technique recited in claims 16-20 is not adequately disclosed. The examiner states the discussion on page 7 of appellants' specification refers to a finite-element method (FEM) analysis, but gives no specific details as to how the analysis is applied to cathodic protection current distribution modeling.

On page 9 of the brief, appellants argue that the FEM analysis is a well known numerical technique, and they refer to The McGraw-Hill Dictionary of Scientific and Technical Terms for the definition of finite-element method analysis. Appellants also state that the FEM analysis is explained on page 7 of the specification and can be done without undue experimentation such that actual steps are not required to be set forth to meet the requirements of § 112, first paragraph.

We note that the first paragraph of 35 U.S.C. § 112, with regard to enablement, requires that the specification enable a person having ordinary skill in the art to make and use the claimed invention. Also, enablement requires that the specification teach those having ordinary skill in the art to make and use the invention without "undue experimentation." In re Vaeck, 947 F.2d 488, 495-96, 20 USPQ2d 1438, 1444-45 (Fed. Cir. 1991).

Also, it is well settled that the examiner has the burden of providing a reasonable explanation, supported by the record as a whole, why the assertions as to the scope of objective enablement set forth in the specification are in doubt, including reasons why the description of the invention in the specification would not have enabled one of ordinary skill in this art to practice

the claimed invention without undue experimentation, in order to establish a prima facie case under the enablement requirement of the first paragraph of § 112. In re Wright, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993); In re Marzocchi, 439 F.2d 220, 223-24, 169 USPQ 367, 369-70 (CCPA 1971).

Upon our review of page 7 of appellants' specification, we find that the specification discloses that using numerical techniques, such as the finite element method (FEM), one can model the current and voltage distribution in concrete and thereby predict that geometric arrangement of ground-beds and the ideal locations for the electrical contacts vis-à-vis the geometry of the bridge and the rebars. (specification, page 7, beginning at line 6). The examiner has not explained why this description of the invention in the specification would not have enabled one of ordinary skill in this art to practice the claimed invention without undue experimentation. Hence, the examiner has not met the required burden. Id.

We therefore reverse the 35 U.S.C. § 112, first paragraph (enablement) rejection of claims 16-20.

II. The 35 U.S.C. § 112, second paragraph (indefiniteness) rejection of claims 14 and 16-20

On pages 5 through 6 of the answer, the examiner states that the phrase "sensing the environment" in claim 14, at line 2, is vague because it is unclear what is being sensed. The examiner also states that the phrase "using a numerical technique" in the last line of claim 16 is indefinite and that the actual operative steps are not set forth.

On pages 9 through 10 of the brief, appellants submit that the phrase "means for sensing the environment" is clear from the

specification for, example, on page 17 at lines 16-17. Appellants also state that the steps of using a numerical technique, such as FEM are known.

With respect to the phrase "means for sensing the environment", upon our review of the specification, we find that the specification discloses, on page 17, that the design of the cathodic protection system should not only include electrode geometric parameters, but also the spatial and temporal effects of micro-environmental, and micro-climatic factors that effect cathodic reaction. In other words, temperature, humidity, wetness, oxygen and chloride concentrations, and pH, should all be included as a part of the design, maintenance and management of the cathodic protection systems. In view of this disclosure, we find that the phrase "sensing the environment" is not indefinite.

With respect to the phrase "using a numerical technique" as discussed supra with respect to the enablement rejection, appellants have demonstrated that numerical techniques, such as FEM, is well known in the art. We note that the claims are broad, but breadth is not indefiniteness. In re Miller, 441 F.2d 786, 787, 169 USPQ 597, 599 (CCPA 1971).

In view of the above, we reverse the 35 U.S.C. § 112, second paragraph (indefiniteness) rejection of claims 14 and 16-20.

III. The rejection of claims 1-15 under 35 U.S.C. § 103 as being unpatentable over Westermann in view of Murphy

The examiner relies upon Westermann for teaching a system for cathodic protection of concrete reinforcing rebars by using a plurality of anode groups E located at various locations. (answer, page 3).

The examiner states that Westermann differs from appellants' claims in that appellants' claims require the measurement of a magnetic field generated by the protection current, and mapping the measured data, as an indication of the proper distribution of the protection current. (answer, page 3).

The examiner relies upon Murphy for teaching mapping of cathodic protection current distribution by using magnetometers to measure the magnetic field of the protection current. (answer, page 3).

The examiner concludes that it would have been obvious to adopt the Murphy technique of mapping the magnetic field of the protection current into the system of Westermann because magnetic mapping does not require direct contact with an object to be protected, and does not obscure small regions of activity. (answer, pages 3-4).

On pages 7-8 of the brief, appellants argue that Westermann does not address the problem sought to be solved by appellants, i.e., the need for uniform distribution and lower installation and maintenance costs, and hence does not disclose appellants' design and monitoring techniques. Appellants further argue that Westermann does not disclose the use of magnetic field sensing means to determine the cathodic protection current.

Appellants admit that Murphy discloses the mapping of currents, but they argue that Murphy's figures only disclose such mapping in a single one-dimensional conductor, namely a pipeline buried in a conducting medium such as soil or asphalt. Appellants point out that their invention maps currents flowing through multiple metal reinforcing bars buried in concrete, (brief, page 8), and urge that there is no evidence of a

motivation to combine the references to solve the problems solved by appellants.

On page 6 of the answer, the examiner rebuts and states that there is no evidence whatsoever that magnetic mapping would somehow be non-applicable to more than one conductor, and that concrete rebars are typically interconnected and thus would in fact be a single conductor.

We provide the following additional observations and findings.

Appellants do not dispute that Westermann teaches cathodic protection of a plurality of conductors in a structure, nor that Westermann teaches sensing and controlling the protection current provided by various anode groups to ensure proper distribution of current. Westermann does not teach magnetic detection and mapping of currents.

Appellants also do not dispute that Murphy teaches a system for mapping cathodic protection current distribution using magnetometers. (column 9, lines 45-47).

In Murphy's system, the magnetic field generated by cathodic protection current is sensed and measured (column 9, lines 50-58), and mapped separately from other currents (column 9, line 64 – column 10, lines 5).

Murphy's mapping system provides a high degree of spatial resolution, allowing small regions of high corrosion activity to be found (column 5, lines 1-2). Murphy teaches that magnetic detection can be remote, so excavation and physical contact with the pipe is not needed (column 1, lines 2-22).

Therefore, the sole issue is whether there is substantial evidence of adequate motivation to support the combination proposed by the examiner.

In view of the above discussed teachings of the applied art, we agree with the examiner that the combination of references renders appellants' claimed mapping method obvious.

That is, we determine that one of ordinary skill in the art would have been motivated to use Murphy's magnetic monitoring and mapping method in Westermann's cathodic protection system to gain the advantages stated by Murphy of remote detection and high spatial resolution.

Furthermore, we note that the motivation to combine need not be identical with appellants' reasons. In re Dillon, 919 F.2d 688, 692, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990) (en banc), cert. denied, 500 U.S. 904 (1991).

Additionally, we are not persuaded by appellants' argument that the level of skill in the art is so low that one of ordinary skill in the art would not know how to map multiple conductors using magnetometers. Appellants have not provided such evidence, and appellants' own specification indicates that such mapping is routine. See, e.g., the description of FEM analysis/mapping found on pages 5, lines 7-12, and paragraph bridging pages 9-10 of appellants' specification. Even though this description is general, we found (as discussed above) the specification to be enabling, especially in view of appellants' admissions that, for example, FEM analysis is routine. Hence, we determine that mapping of multiple conductors is routine.

In summary, we find that because one of ordinary skill in the art would have been motivated to combine the teachings of Wassermann and Murphy resulting in a system that permits magnetometer mapping of cathodic protection currents, we agree with the examiner that the subject matter of claims 1-15 would

have been obvious, and we therefore affirm the rejection of claims 1-15.

IV. The rejection of claims 16 through 20 under 35 U.S.C. § 103 as being unpatentable over Murphy, with or without Westermann, in view of the admitted prior art

Claim 16 requires numerically modeling current and voltage distribution in a proposed structure as part of a process of designing a cathodic protection system having a continuous uniform cathodic protection throughout the structure.

The examiner has not explained how or why Westermann or Murphy teaches uniform distribution in a cathodic protection system, nor is there any explanation of how appellants' disclosure is faulty in this regard.

Nor has the examiner explained that Westermann's anode groups provide for continuous uniform distribution of cathodic protection throughout the entire structure as required by appellants' claim 16. Westermann, in discussing the background art, indicates that individual adjustment to the current to each anode is not normally allowed (column 1, lines 64 through column 2, line 1 of Westermann). Such individual adjustment is not necessarily compatible with uniform current distribution, and the examiner does not point to any disclosure in Westermann that teaches that a continuous uniform distribution of cathodic protection is provided by the system of Westermann.

Because the examiner has not directed our attention to any teaching in the applied art of designing a cathodic protection system having continuous uniform distribution of cathodic protection throughout the structure, we reverse.

CONCLUSION

The 35 U.S.C. § 112, first paragraph (enablement) rejection is **reversed.**

The 35 U.S.C. § 112, second paragraph (indefiniteness) rejection is **reversed.**

The rejection of claims 1-15 is **affirmed.**

The rejection of claims 16-20 is **reversed.**

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR 1.136(a).

AFFIRMED-IN-PART

Beverly A. Pawlikowski Administrative Patent Judge	)	
Linda R. Poteate Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
Mark Nagumo Administrative Patent Judge	)	

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